

Hypothesis Testing: Determining Type I and Type II Errors

In a statistical test of a hypothesis, researchers can come to two types of incorrect conclusions. The hypothesis can be inappropriately rejected (this is called type I error), or the hypothesis might be inappropriately accepted (a type II error). The Greek letter α is used to denote the probability of type I error, and the letter β is used to denote the probability of type II error. Consider the information in the table below:

		Decision (based on observed sample)	
		<i>Accept H_o</i>	<i>Reject H_o</i>
Outcome	<i>Null Hypo. (H_o) is True</i>	Correct Decision	Type I (α /Alpha) Error
	<i>Alt. Hypo. (H_1) is True</i>	Type II (β /Beta) Error	Correct Decision

Now, for each of the following scenarios identify (using ordinary language) what would constitute the null hypothesis, the alternative hypothesis, Type I error, and Type II errors.

Example A. A jury must decide whether a person accused of setting a deadly fire is guilty of arson.

H_0 : _____

H_1 : _____

	<i>Accept H_o</i>	<i>Reject H_o</i>
<i>Null Hypo. (H_o) is True</i>	Correct Decision	
<i>Alt. Hypo. (H_1) is True</i>		Correct Decision

Example B. A woman takes a home pregnancy test.

H_0 : _____

H_1 : _____

	<i>Accept H_o</i>	<i>Reject H_o</i>
<i>Null Hypo. (H_o) is True</i>	Correct Decision	
<i>Alt. Hypo. (H_1) is True</i>		Correct Decision

Example C. A college student pulls an all-nighter to study for a midterm exam.

H_0 : _____

H_1 : _____

	<i>Accept H_o</i>	<i>Reject H_o</i>
<i>Null Hypo. (H_o) is True</i>	Correct Decision	
<i>Alt. Hypo. (H_1) is True</i>		Correct Decision

In which of the above situations might a false positive (or a Type I error) be the most egregious error? A false negative (or a Type II error)?